

Degen on the "Perennial Moulting" in the Australian Piping Crow.—As shown by the title,¹ Mr. Degen's memoir is not merely an account of the moulting in one of the species of Australian Piping Crows, but an attempt to throw light upon "the archæornithic type from which the wing of the modern bird has been evolved. The main object of the paper is stated to be "to give additional evidence in support of the theory of the derivation of the feathering of the bird's wing." It was therefore found "necessary to ascertain the mode by which the perennial moulting of the individuals of a species of bird is made up from the earliest to the last stages of renewal; and, further, to what extent each feather participates in this annual process during the period of complete feather-change." The species chosen for this investigation is the *Gymnorhina tibicen*, in which the moulting of the flight-feathers is traced from the beginning to the completion of the moulting. The various stages, from the dropping of the first remex to the completed growth of the one last moulted, are described in detail and very clearly illustrated by numerous diagrams. Not only is the moulting in this species traced in the most minute detail, but the history and previous literature of the general subject of ecdysis is considered, mostly *passim*, and the recent papers by Mr. Witmer² Stone and Dr. J. Dwight are frequently cited, as well as those of earlier writers. Beyond the minutely detailed record of the conditions of feather-change in the Piping Crow, there is little that is new to the general subject, but a confirmation of the conclusion reached by others as to the order of shedding and replacement of the flight-feathers. The two distinctly different principles of shedding and renewal are, first, "the regular sequence of their renewal on the hand-portion from within outwards, though accelerated in certain places or retarded in others, in order to maintain the requisite balance for flight, by a system of approximate symmetry for the whole wing during this critical change. This is the principle which forms the rule for probably the entire order of the Passeres," but not for some of the Picariæ and many of the lower forms of birds. In the case of the cubital quills the moulting begins with the first outer remex and proceeds inward to the fourth, but in the next series of three the order of moulting is reversed, beginning with the seventh remex, then the sixth, and then the fifth.

"The renewal of the wing-coverts presents some notable deviations from that of the flight-feathers." While the latter assume their permanent order of renewal in the first moulting, the wing-coverts pass through transitional stages before attaining their permanent order of renewal. A

¹ Ecdysis, as Morphological Evidence of the Original Tetractyle Feathering of the Bird's Fore-limb, based on the Perennial Moulting in *Gymnorhina tibicen*. By Edward Degen, F. Z. S. Trans. Zool. Soc. London, Vol. XVI, Part viii, pp. 347-412, pls. xxxvi-xxxviii. May, 1903.

² Erroneously spelled "Wittmer" throughout the memoir.

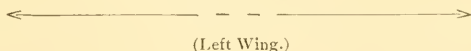
"marked transverse or vertical element" is found to enter into the conditions, and "this transverse arrangement is a survival, therefore," according to the author, "of the phylogenetic affinities which link the present Class Aves to their Saurian ancestry." The great importance of the wing-coverts in "helping to clear up outstanding questions connected with the evolution of the organ of flight" has been fully reorganized by Pycraft and Goodchild whose conclusions are here cited.

Under the head of 'Conclusions' is a long discussion of the evolution of the wing of the modern bird, with regard to the original point of origin of the flight-feathers. His final conclusions are expressed in the following

REVISED SCHEME FOR THE DERIVATION OF THE FLIGHT-FEATHERS
FROM THE TETRADACTYLE ANCESTRAL FORM OF BIRDS.

Proto-metacarpo-digitals = Flight feathers of Phalangeal Origin.	Hypo-metacarpo-digitals = Flight feathers of Metacarpal Origin.
	DIGIT I.
Suppressed (lost).	Present Pennæ pollicis IV-I.
	DIGIT II.
Present Metacarpo-digitals XI-VI.	Present intercalary row I-VI.
	DIGIT III.
Present Metacarpo-digitals V-I.	Present Cubital Group II, Secondary Remiges (o) I-IV.
	DIGIT IV.
Present Cubital Group III, Secondary Remiges V-VII.	Present Cubital Group I, Secondary Remiges VIII-X.—Cubiti veri XI-r.

Direction of Moul.



"From the foregoing scheme it may be observed that there are no flight-feather equivalents allotted to the phalangeal portion of Digit I, in which part they figure as 'suppressed'. . . . This tendency towards a part-suppression, if carried further, would have the effect of leading to total apoptilism. It, moreover, must have proceeded contemporaneously with the feathering of the forearm and was still in progress after, as is evidenced in the Passeres, where it has reached the present climax in the Oscines proper.

"Considering the genealogical relative shortness of Digit I, coupled with the fact of a still greater reduction of size in the present forms of birds to one compound element, there is strong probability existing that, during the course of the fusion of the phalangeal segments of this digit with its originally independent metacarpal bone, they were stripped off

one after the other as in the case of the 'remicle' and other diminutive coverts"

As to the question of 'diastataxy,' the author believes that the present inquiry "supplies proof that 'faulting' is not confined alone to diastatatic wings, but takes place, though in inferior degree, in the short-armed eutaxic forms of birds, such as the Passeres."—J. A. A.

Weed's Bibliography of Economic Ornithology.—As the title states, this is only a "partial bibliography" of the subject to which it relates,¹ but as such it is disappointing as well in what it contains. Beginning with Wilson. 1808-14, we have listed a miscellaneous assortment of general works, as those of Bonaparte, Audubon, Nuttall, etc., and of special papers dealing often in only a slight or incidental way with the food habits of birds, while a number of 'reports' and papers treating especially of such matters are omitted. While a large part of the titles cited are more or less pertinent, we find no reference to several of the most important papers and reports that treat especially of the economic relations of Birds. In preparing the bibliography of such a subject, it is difficult to properly adjust the line of exclusion, but the omission of some of the most important titles seems to imply lack of care in compilation.—J. A. A.

Howe and Sturtevant's Revised List of the Birds of Rhode Island.²—This brochure of 24 pages "endeavors to bring up to date the present knowledge of Rhode Island avifauna, and to correct that work [the original list, published in 1899] both in misstatements and typographical errors." 'Part I,' of two pages, contains a note by Mr. James M. Southwick on the collection of Rhode Island birds presented to the Museum of Natural History at Roger Williams Park, Providence, by the late Charles H. Smith, which is stated to contain 292 species, represented by 480 specimens. Then follows 'Part II,' a 'Revised Annotated List of the Birds of Rhode Island,' numbering 283 species, besides 3 entered as "extirpated," and 8 as hypothetical. Several species of the original list are 'dropped', and five are now added. Mr. Howe needlessly proposes (p. 22, footnote) the new generic name *Paulomagus* for the House Wren!—J. A. A.

¹ A Partial Bibliography of the Economic Relations of North American Birds. By Clarence M. Weed. New Hampshire College Agricultural Experiment Station, Technical Bulletin No. 5. Durham, N. H., 1902. Svo, pp. 139-179.

² A Supplement to the Birds of Rhode Island. By Reginald Heber Howe, Junior, and Edward Sturtevant. Svo, pp. 24. Middletown, Rhode Island, 1903.